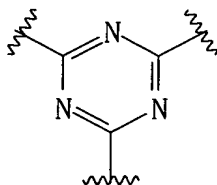


We claim:

1. A polymer electrolyte membrane comprising a highly fluorinated polymer comprising: a perfluorinated backbone, first pendent groups which comprise sulfonic acid groups, and crosslinks comprising trivalent groups according to the formula:



( I ).

2. The polymer electrolyte membrane according to claim 1 wherein said first pendent groups are according to the formula:  $-R^1-SO_3H$ , where  $R^1$  is a branched or unbranched perfluoroalkyl or perfluoroether group comprising 1-15 carbon atoms and 0-4 oxygen atoms.

3. The polymer electrolyte membrane according to claim 1 wherein said first pendent groups are according to the formula:  $-O-CF_2-CF_2-CF_2-CF_2-SO_3H$ .

4. The polymer electrolyte membrane according to claim 1 wherein said first pendent groups are according to the formula:  $-O-CF_2-CF(CF_3)-O-CF_2-CF_2-SO_3H$ .

5. A method of making a polymer electrolyte membrane comprising the steps of:

- providing a highly fluorinated polymer comprising: a perfluorinated backbone, first pendent groups which comprise sulfonyl halide groups, and second pendent groups which comprise nitrile groups;
- forming said fluoropolymer into a membrane;
- trimerizing said nitrile groups to form crosslinks; and
- converting said sulfonyl halide groups to sulfonic acid groups.

6. The method according to claim 5 wherein said second pendent groups are selected from  $-C\equiv N$  and groups according to the formula:  $-R^1-C\equiv N$ , where  $R^1$  is a

branched or unbranched perfluoroalkyl or perfluoroether group comprising 1-15 carbon atoms and 0-4 oxygen atoms.

7. The method according to claim 5 wherein said first pendent groups are

5 according to the formula:  $-R^1-SO_2X$ , where X is a halogen and where  $R^1$  is a branched or unbranched perfluoroalkyl or perfluoroether group comprising 1-15 carbon atoms and 0-4 oxygen atoms.

8. The method according to claim 6 wherein said first pendent groups are

10 according to the formula:  $-R^1-SO_2X$ , where X is a halogen and where  $R^1$  is a branched or unbranched perfluoroalkyl or perfluoroether group comprising 1-15 carbon atoms and 0-4 oxygen atoms.

9. The method according to claim 7 wherein said first pendent groups are

15 according to the formula:  $-O-CF_2-CF_2-CF_2-CF_2-SO_2X$ .

10. The method according to claim 8 wherein said first pendent groups are

according to the formula:  $-O-CF_2-CF_2-CF_2-CF_2-SO_2X$ .

11. The method according to claim 7 wherein said first pendent groups are

20 according to the formula:  $-O-CF_2-CF(CF_3)-O-CF_2-CF_2-SO_2X$ .

12. The method according to claim 8 wherein said first pendent groups are

according to the formula:  $-O-CF_2-CF(CF_3)-O-CF_2-CF_2-SO_2X$ .

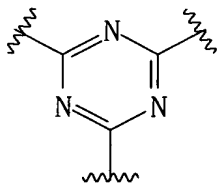
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13. A polymer electrolyte membrane made according to the method of claim 5.

14. A polymer electrolyte membrane made according to the method of claim 6.

30 15. A polymer electrolyte membrane made according to the method of claim 7.

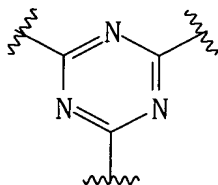
16. A polymer electrolyte membrane made according to the method of claim 8.
17. A polymer electrolyte membrane made according to the method of claim 9.
- 5 18. A polymer electrolyte membrane made according to the method of claim 10.
19. A polymer electrolyte membrane made according to the method of claim 11.
- 10 20. A polymer electrolyte membrane made according to the method of claim 12.
21. A polymer membrane comprising a highly fluorinated polymer comprising: a perfluorinated backbone, first pendent groups which comprise groups according to the formula  $-SO_2X$ , where X is F, Cl, Br, OH, or  $-O-M^+$ , where  $M^+$  is a monovalent cation,
- 15 and crosslinks comprising trivalent groups according to the formula:



( I ).

22. The polymer membrane according to claim 1 wherein said first pendent groups are according to the formula:  $-R^1-SO_2X$ , where  $R^1$  is a branched or unbranched
- 20 perfluoroalkyl or perfluoroether group comprising 1-15 carbon atoms and 0-4 oxygen atoms.
23. The polymer membrane according to claim 1 wherein said first pendent groups are according to the formula:  $-O-CF_2-CF_2-CF_2-CF_2-SO_2X$ .
- 25 24. The polymer membrane according to claim 1 wherein said first pendent groups are according to the formula:  $-O-CF_2-CF(CF_3)-O-CF_2-CF_2-SO_2X$ .

25. A polymer comprising a highly fluorinated polymer comprising: a perfluorinated backbone, first pendent groups which comprise groups according to the formula  $-SO_2X$ , where X is F, Cl, Br, OH, or  $-O-M^+$ , where  $M^+$  is a monovalent cation, and crosslinks comprising trivalent groups according to the formula:



( I ).

26. The polymer according to claim 1 wherein said first pendent groups are according to the formula:  $-R^1-SO_2X$ , where  $R^1$  is a branched or unbranched perfluoroalkyl or perfluoroether group comprising 1-15 carbon atoms and 0-4 oxygen atoms.

27. The polymer according to claim 1 wherein said first pendent groups are according to the formula:  $-O-CF_2-CF_2-CF_2-CF_2-SO_2X$ .

28. The polymer according to claim 1 wherein said first pendent groups are according to the formula:  $-O-CF_2-CF(CF_3)-O-CF_2-CF_2-SO_2X$ .